A Journal of Radix International Educational and Research Consortium

RIJEBM
RADIX INTERNATIONAL JOURNAL OF ECONOMICS & BUSINESS MANAGEMENT

ANALYSIS OF THE GROSS MARGIN FOR SMALLHOLDER COTTON PRODUCTION IN METEMA WOREDA

ABEBE DAGNEW

Department of Agricultural Economics
College of Agriculture and Rural
Transformation, University of Gondar

GENANEW AGITEW
Department of Agricultural Economics
College of Agriculture and Rural
Transformation, University of Gondar

ASSEFA TILAHUN
Department of Agricultural Economics
College of Agriculture and Rural
Transformation, University of Gondar

ABSTRACT

With the aim to study gross margin of the smallholder cotton producers in Metema area, cross-sectional survey involving both quantitative and qualitative approaches was employed. The data were generated using household survey from lead cotton smallholder farmers, key informant interview with cotton traders and marketing institutions. Taking all possible costs that smallholder cotton producers used and the revenue generated from sales in the local market, the study revealed that smallholder cotton producers are benefited by generating higher return with gross margin of 39%. From the cost side of the smallholder cotton production, 27% of the total cost is found to be on weeding followed by harvesting and oxen driven plough. Average product of cotton in the study area per hectare is reported to be 12.05 quintals. Despite higher potential of the area for cotton production, the smallholders are challenged by different endogenous and exogenous constraints ranging from production to marketing chain. Crop pest and quality issues are some of production constraints whereas market constraints are characterized by asymmetry of price information and limited buyers of the product affecting the bargaining power of smallholder producers. The study boldly recommended that creating access to the market information and stakeholder integration are profoundly important.

Keywords: Gross margin, cotton, production, demand and investment

BACKGROUND OF THE STUDY

Cotton is one of the major cash crops in Ethiopia and is extensively grown in the lowlands under large-scale irrigation schemes and also in small-scale level under rain fed agriculture (EIA, 2012 & Bosena *et al*, 2011). As the case in different food and cash crops produced in the country, the larger contribution comes from smallholder faming. Ethiopia has excellent cotton-growing conditions and a significant amount of land potentially suitable for cotton production (EIA, 2012; Merima & Gezahegn, 2008). However, evidences have suggested that despite its potential and long standing tradition in production cotton, the contribution of Ethiopia in African total production for the past decades was not more that 5%, while Egypt, Tanzania, Chad, Mali, Benin, Burkina Faso and others had taken the lion's share. While production appears to be on an upward course, cotton output in previous years has been relatively flat, thereby keeping the country from reaching its production targets, as outlined in the five-year Growth & Transformation Plan (Abu, 2015). On the other hand the revenue earned from this important cash crop is minimal compared to other agricultural commodities (Bosena *et al*, 2011), which could be explained in terms of production, associated constraints and local and international market of cotton. It has been noted by Merma and Gezahegn (2008) that in spite of its poor performance, the cotton sub-sector still offers a unique opportunity for Ethiopia in terms of serving as a bedrock upon which the country can shift to high value added technological transformation following its strong backward and forward linkages with various sectors, and its provision of employment opportunities for the large number of the rural poor. The lifelong experiences and strong attachments of farming community in production of cotton could tell us it is related with the livelihoods as it generated income for households. However, the commodity lacks innovative value-chain development among the stakeholders with limited structural and functional relationships. In connection with it, Alebel *et al* (2014) noted that there are no clear roles and responsibilities for the different actors involved along the value chain of cotton.

Metema area is one of cotton producing areas of the country in which small, medium and large scale commercial farming are characterizing. The general farming system of Metama area is mixed (crop and livestock) farming. The cotton farming particularly, the smallholders' in the area is characterized by rain fed and associated with fluctuation of market price. The smallholders produce cotton along with other crops mainly with sesame and sorghum, which share relatively larger plot of households.

Increasing demand for cotton to feed growing textile industries both national and international contexts calls huge investment on this specific agricultural commodity using existing opportunities. It is also the high time to enhance production, quality and efficiency of smallholder farmers engaged in industrial crops such as cotton. In connection with it, understanding the gross margin of cotton production, which is the important component of value chain from field to textile industries, is profoundly important. Taking the manifold contributions and increasing demands of cotton and the quest to know the fate of the smallholder producers, who have adopted high yield variety, the study is aimed to determine the possible financial benefits (i.e gross margin) gained from cotton production using improved seeds, pest and weed management techniques.

METHODS USED

The study was conducted in Metama Woreda, which is one of cotton producing area of Amhara Regional State, Ethiopia. It was designed to be cross-sectional survey, involving both quantitative and qualitative approaches. Two-stage sampling technique was used to draw sample cotton producer farmers from 60 lead farm households, who are beneficiaries of improved cotton seed. First, potential (improved cotton producing) Kebeles (the lowest administrative areas) namely Kokit, Meka, Mender 6,7,8, Metema Yohannes and Das were taken purposively. Then, based on representativeness of smallholder farmers, three Kebeles, excluding Metema Yohannes and Das were taken as the sample areas. Sample households from each Kebeble were selected proportional to the lead farmers in each selected areas and 37 farm households representing 76% were taken as sample households.

Table 1: Distribution of sample size from selected areas (N=37)

Kebele	Improved cotton seed user	Sample size taken
Kokit	22	18
Meka	14	9
Mender 6,7,8	13	10
Total	**49**	**37**

Data from primary and secondary sources were generated using different techniques and tools. Household survey of lead farmers using structured and semi-structured interview schedule, key informant interview of Cooperative Manger, Metema and surrounding areas traders using checklist and on-spot observations were used to collect primary data. The data from secondary sources such as documents and reports from Metema Agricultural Cooperative Union and Tiret Cotton Ginnery were also used.

The quantitative and qualitative data generated from both primary and secondary sources were analyzed using marketing margin (gross marketing margin). The gross margin in the study represents the percent of total sales revenue that the cotton farm retains after incurring the direct costs associated with production of cotton. The higher the percentage, the more the cotton farm retains on each *birr* of sales to service of its other costs and obligations.

$$\text{Gross Margin}(\%) = \frac{\text{Revenue} - \text{Cost of Goods Sold}}{\text{Revenue}}$$

The qualitative data generated using different techniques were also analyzed qualitatively to support or explain more about the quantitative findings.

RESULTS AND DISCUSSIONS

Demographic and Socio-Economic characteristics of sample households

The age of the sample respondents ranges from 32 to 63 years and the average age of sample respondents were 46.8 years with a standard deviation of 7.57. Of the total sample farm households, 97.3% were male-headed and the remaining 2.7% were female-headed implying that more of the sample households were male. Educational status of individuals could have implication on in adopting improved technologies and exercising better management techniques. Taking the important contribution of education into considerations, the study has roughly assessed the status of respondents. As a result, it is found that around 27% of the sample households were illiterate, 27% can just read and write without attending formal education. From respondents, who had attended formal education, 35.1% were at primary level education, 8.1% were at junior secondary level of education and only 2.7% were reported that they have attended secondary level of education.

Land, which is the central to economy, social and political spheres of community, society and nation at large is crucial asset. With respect to land holding of the households, an average size of land owned per household is found to be 7.03 hectares, which is by greater than the regional average. Smallholder farmers' land allocation for different crops grown, significantly vary from one to another based on the priority of the households. From randomly taken cotton producing smallholder farmers in Metema area, on average 0.96 hectare of land is allotted for cotton production, whereas larger proportion is for sesame and sorghum.

Table 2:- Demographic and socio-economic characteristics of sample households (N=37)

Variable	Mean/Number	STD/%
Age(years)	46.8	7.57
Sex		
Female	1	2.7
Male	36	97.3
Education		
Illiterate	10	27
Can read and write	10	27
Primary school	13	35.2
Junior Secondary	3	8.1
Secondary school	1	2.7
Landholding(ha)	7.03	3.46
Land allocated for cotton(ha)	0.96	0.41
Cotton farming experience(Year)	17.05	7.05
Years of experience in using improved cotton seed(Year)	2	1

Source: own computation, 2015

ACCESS TO SERVICES

Access to services like credit, agricultural extension and market information has vital importance to promote agricultural households' production and productivity which thereby increase marketable surplus and ultimately farm income. For smallholder cotton producing farmers, knowing where and when to sell their output is one of the most difficulties in the study area. If they have no knowledge of current market prices, they can easily be exploited. But gathering current information about markets may not be easy, especially for people living in very remote areas such and Metema and the like areas.

Respondents in the study area were also interviewed whether or not they have access for services like credit and market information and from the total respondents replied, 35.1% have access for credit services from Amhara Credit and Saving Institution, whereas 43.2% have reported both from their own and Amhara Credit and Saving Institutions and 2.7% from other institutions for their cotton production. With regard information, about 40.5% of the total respondents have an access for local market information and 8.1% were accessed national market price information from local traders (Table 3).

Table 3: Access to credit and market information (N=37)

Variable	Number	(%)
Local Market Information		
Yes	15	35.1
No	22	59.5
National Market Information		
Yes	3	8.1
No	34	91.9
Credit Access		
Own	7	18.9
ACSI	13	35.1
Own and ACSI	16	43.2
Others("Arata creditors")	1	2.7

Source: Survey Result, 2015

PRODUCTIVITY OF COTTON AND MARKET OUTLETS

It was reported by MoARD (2005) that productivity of cotton in Ethiopia of rain fed small-scale farmers ranges from five to ten quintals per hectare. RATES (no dated) also indicated that productivity of cotton at small-scale farmers' level is 8Qt/ha. The increments has been observed in this study that average productivity of cotton in quintal per hectare in the area studied is found to be 12.05 Qt/ha with a standard deviation of 6.76. This could be explained partly due to utilization of improved cotton seed and best management practices by the lead farmers and better supports from cooperatives union and agricultural extension service.

Photo showing the partial view of cotton farm of the beneficiaries of improved seed in Mender 7(July, 2015)

Cotton produced in Metema area passes through different channels before it reaches to the end users. The major actors in cotton marketing channel are producers, local traders, cooperatives' union and ginneries. The lead cotton producer farmers in the area supply products for cooperative union. The data generated from household survey show that 81.1% farmers supply their products of 2014/15 cropping season to cooperative union followed by the proportion of farmers who sold both for cooperative unions and traders. 5.4% of smallholder farm households reported that they supplied to local traders (Table 4).

Table 4: Cotton production and market outlets

Variable	Mean (Number)	STD (%)
Amount produced in 2014(qt)	12.05	6.76
To whom the product was sold (%)		
➢ Local Traders	2	5.4
➢ Cooperative unions	30	81.1
➢ Cooperatives and traders	5	13.5
Total	**37**	**100**

Source: Survey Result, 2015

GROSS MARKETING MARGIN (GMM)

Once the basic structure of a marketing channel is established, it is relatively easy to collect information on the price at which the product is bought and sold at each stage in the production process (Smith, 1992). Knowledge of marketing costs and margins in a chain will enable us to identify how revenues and margins are distributed over the actors in the market chain in order to conclude whether they can increase margins in the market chain or not. Gross margin is frequently expressed as a percentage, called the gross margin percentage.

$$\text{Gross Margin}(\%) = \frac{\text{Revenue} - \text{Cost of Goods Sold}}{\text{Revenue}}$$

The cotton gross marketing profit analysis for 2014 showed that the average gross gained for the cotton producers was on average estimated to be 41Birr/Qt. using the following computation.

Gross Market Margin (GMM) = (Benefit-Cost)/Benefit

= (16967.73-10311.76)/16967.73

=0.39

Gross Market Margin (%) = Benefit-Cost)/Benefit*100

= (16967.73-10311.76)/16967.73*100

=39%

Table 5. Benefits earned and costs incurred by cotton producers per hectare per head and the share of each cost item (2014/15)

Item	**Average value(birr/ha/hd)**	
Amount sold in 2014 in quintal	12.05	
price per quintal for 2014	1408.11	
Total Benefit(sales)	**16,967.73**	
	Birr /ha/hd	**% share of cost incurred**
Cost for land preparation	617.03	5.98
Cost for oxen ploughing	1440.95	13.97
Cost for fertilizer	1330.95	12.91
Cost for Chemicals	247.16	2.40
Cost for seed	515.76	5
Cost for loading and unloading	77.67	0.7
Cost for transportation	215.21	2.1
Cost for weeding	2575.00	24.97
Cost for harvesting	1995.81	19.35
Cost for post harvest loss	22.84	0.2
Cost for sack	240.84	2.3
Cost for filling	113.62	1.1
Cost for land rent	918.92	8.9
Total Costs	**10,311.76**	**100**
Gross Margin	**0.39**	

Source: own computation, 2015

NB: ha=hectare, hd = household head

During cotton production season in 2014, labor cost for weeding (24.97%), which is the maximum cost incurred followed by labor cost for harvesting (19.35%), cost for oxen ploughing (13.97%) and cost of fertilizer (12.91%) took the lion's share from the total cost (Table 6).

This high shared in percentage of costs incurred is found to be in weeding, oxen driven plough and harvesting activities. Since, weeding is performed two times per production season. The frequency

coupled with the higher labour cost during the peak times of weeding have contributed to share the highest compared to other operational activities. With the same token, during harvesting, there is additional work to be performed to maintain the quality of the cotton. As a result, many labors with higher payment are required. The cost associated with ploughing could be explained with frequency of tilling and the shorter duration the activities need more investment.

CONSTRAINTS AND OPPORTUNITIES

CONSTRAINTS

Smallholder cotton production and marketing in Metema area is constrained by endogenous and exogenous factors, which are significantly affecting both the quantity and quality. One of the production constraints is occurrence of pest, such as stock borer and leaf cutter are reported to be challenging the smallholder cotton production. Locally known as "Workit or flea bit" which affects leaf especially at germination stage and "Goy Til" which eats flower and boll of cotton are the type of insects which have considerably affects the quantity and quality. The problems of insects are also exacerbated due to shortage of insecticide, particularly during the peak times of infestation.

Moreover, high cost of the improved seed of cotton compared to the locally available; unskilled labour involved during harvesting, which is the cause for the quality problem; similar time for loan repayment and harvesting, untimely access to credit and erratic rainfall are some of the problems affecting the cotton production.

Important but not genuinely considered problems associated with smallholder cotton production in the study area, is market or institutional constraint which has run with limited and/or asymmetry market information. Market related problems in Metema area are characterized by restricted and /or predetermined buyers of the commodity, in which farmers' bargaining powers on setting price is hampered. The lead farmers, who have adopted the improved variety of cotton, are linked with agricultural cooperatives which themselves have their own institutional problems. Fluctuation of price and weak market linkage along with absences of stakeholder integration, have impacted the production and chain of cotton marketing. Despite creating input and financial opportunities, the farmers have been compromised searching alternative market option.

OPPORTUNITIES

There are different opportunities to be used to enhance the production of cotton in Metema area. Conducive agro-ecology and soil to grow cotton, rich and long standing traditional experience of famers in producing the commodity and availability of labour especially during the peak seasons of weeding and harvesting are opportunities available. Access to inputs such as improved seeds and chemicals and increasing support from different organizations and agricultural extension service provision could enhance productivity of smallholder cotton producers. Linking agricultural commodity with different industries and institutes is useful pathway to transform the sector, particularly industrial crops such as cotton. In the study and the nearby areas, there are emerging ginneries and different financial institutes such as Amhara Credit and Saving Institute, which could consolidate the two-ways interaction between cotton production

and industry. This in turn, can enhance the productivity of smallholders and create market opportunities. The infrastructure including road, which connects different area to the market centers, transportation facilities, telephone and availability of banking services are also important opportunities to produce and upscale cotton production.

Table 6: Constraints and Opportunities for Cotton Production and Marketing

	Constraint	Opportunities
Production	• Insect problems (*wokit* and *goy til*) • Unskilled hired Labors lack during harvesting • Erratic rain fall/climatic changes • No organized farm record keeping. • Lack of capital for input purchase • Loan repayment schedule and harvesting time is the same • Limited access of credit is only available on specific time (once a year e.g. ACSI give credit only during ploughing and sowing)	• The suitable agro ecology a • Ample experience of farmers in cotton production • Access of labor • Availability of inputs(improved seed, labor, fertilizer) • Access of infrastructure(road) • Existence of support NGOs and GOs • Expansion of textile industry in Metema and in the country • Expansion of financial institutions
Marketing	• Market information asymmetry • No media coverage for cotton production and marketing • Unrealized promise of cooperatives and union to purchase the product with high price • Cotton price fluctuation • Poor cotton market linkages among stakeholders • Big prices difference of both for improved and local seeds while the product is equality sold at market	• Access of markets (local, national and international) • Expansion of textile industry in Metema and in the country • Conductive infrastructure like road, cell phone • Expansion of financial institutions who provide credit

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Smallholder famers in Metema produce different crops and the area is known as one of cotton producing regions of the country in which small, medium and large scale commercial farming are characterizing. Compared to different crops produced in the area, land allocated and the management practices in cotton

production by farmers is minimal implying that cotton is not the priority crop. However, the long-standing and rich traditional experience of farmers in producing the commodity maintained the strong attachment as it supplement the income generation of farm households.

Investment on cotton incurs different direct and indirect costs that could directly affect the market margin. Farmers costs of producing cotton in 2014 cropping season show that the larger proportion is found to be for weeding followed by harvesting, oxen driven plough and fertilizer. As it is indicated by the gross marking margin of the smallholders taking the costs incurred and revenues generated from the sales in the local market, cotton in Metema areas is rewarding cash crops with higher return. This shows that if smallholders are encouraged and supported by different inputs with recommended extension packages by linking with market, which currently in the area is characterized by asymmetry of information, it is highly possible to further improve the productivity and hence the domestic production that could steadily feed the emerging textile industries by substituting imported cotton.

The major actors in the study area for cotton marketing channel were producers, local traders, cooperatives' union and ginneries. Cotton producer smallholder farmers, who have received improved cotton seed in the Woreda supply much of their products produced in 2014 cropping season for cooperative unions. This marketing relationship, which is limited between producers and cooperative union has compromised smallholder farmers in searching alternative market and reduced bargaining power on price, which in turn affect the next production.

The smallholder cotton production has been challenged by different production and market constraints. On the other hand, there are also enabling opportunities to be used, but efforts to minimize the constraints and use opportunities by concerned stakeholders in innovative ways is minimal and if any, the support is limited to few actors.

RECOMMENDATION

Even though the GM of the smallholder cotton producer farmers is attractive, there is a room to boost more the GM without requiring additional resource. That is to say, there should be a mechanism to solve the constraints and to exploit the opportunities since these constraints are the factors that reduce the GM. Accordingly, the following recommendations are forwarded to design appropriate intervention strategy and to strengthen the existing workable strategy.

- There should be credit access in required amount and time. In other words, since the current formal credit provider is ACSI and its maximum credit to the individual farmer is below what each of the household demanded. Moreover, the credit access should be available not only during ploughing and sowing but also during weeding and harvesting.
- The cost share of weeding, harvesting, oxen rent with farmer (oxen driven plough) and fertilizer took the lion's share of the total costs of cotton production. To this effect, there should be a technology that can minimize the cost of these inputs. The other option is that, as it was observed those farmers who produce on small scale had lower GM than those who produced on large scale relatively; cotton

production is profitable on large scale so as the per unit cost of production is lower than the small scale.

- Inconsistent support of cotton producer farmers specifically during harvesting and marketing was reported to be the gap of technical assistance. Therefore, agricultural extension, cooperative union and multipurpose producer cooperatives' support should be consistent throughout the production period.
- Cotton producer in the study area have limited access for market information. To increase the market efficiency of the cotton, there should be local and national market or price information access to producers through different media like for sesame and other cash crops.

The study has revealed that the cotton production is affected by different pest and the existing insecticides were ineffective and sometime not available when demanded, affecting the quantity and quality. Therefore, it is highly important to create access to insecticides in required amount through cooperatives and cost-effective biological and mechanical controlling mechanisms should in place.

- To improve the quality of cotton product, the negative attitude of truck owner and trader or local collectors should be solved through sustainable training and consultation. Note that intensive training was given only for improved cotton producers, cooperatives and some local traders. Hence, the training should be inclusive for all main actors in the market, particularly to truck owner; these should be advised and trained during transportation of cotton after harvesting.

- Unskilled hired labour during harvesting time is the cause for quality problems of cotton. To avoid this, cotton producing farmers should be advised to take measure to control quality they have to be capacitated by offering training and close follow up and supervisions should be in place.

- Cotton producer farmers in particular and farmers of area in general should be encouraged to keep farm records so that they can develop cropping calendar so as to know the sequence of crop rotation and occurrence of recurrent drought. To this effect, continuous training and education should be given to improve the skills, attitude and knowledge of smallholder farmers.

- Expansion of ginnery and textile industry should be strengthened so that smallholder farmers can get demand for their product that encourages them to improve the quantity and quality of cotton product.

- One of the missing links identified by study is weak innovation interaction between farmers, traders and industries involved in cotton production and marking for collaborative knowledge and best experiences sharing. Therefore, there should be strong linkage among farmers, cooperative union, multipurpose cooperatives and other stakeholders in order to improve and support of smallholder cotton producer farmers.

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Annexure

Annexure A

Cotton Weighted Product (Qt) and Price (Br/Qt) From 201-2014

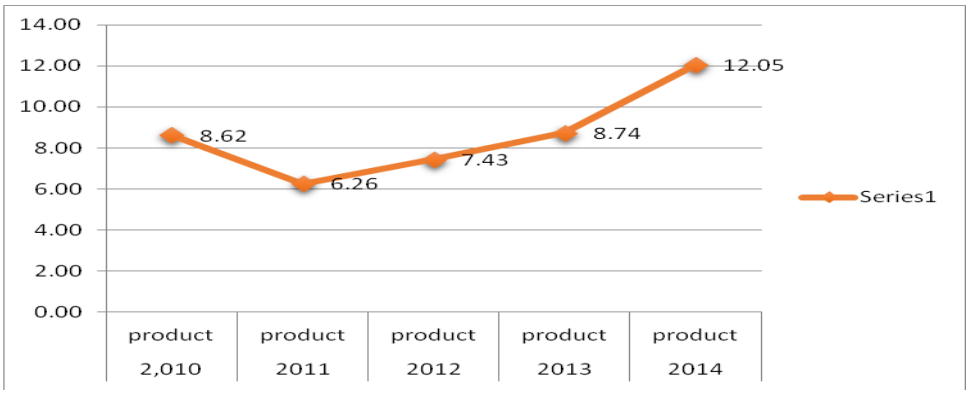

Figure 1. Cotton weighted product (Qt) trends (2010-2014)

Figure 2. Cotton weighted Price (Br/Qt) Trends (2010-2014)

Table 7. Cost of production, Total Revenue and Gross Margins for cotton production

														for 2014				
Cost incurred for cotton preproduction and marketing														Total Cost/ha	Price	sold	Total Revenue	Gross margin	Gross margin
	Land pre	Ox plough	Fertilizer	Seed	Chemical	ad Unlo	Transport	weeding	Harvesting	PostHar	Sac	Filling	Land tax	6,022.00	1400	6	8400	0.28	28.31
	140	400.00	1,018.00	360.00	0.00	24.00	72.00	1,600.00	1,200.00	0.00	144.00	64.00	1,000.00	6,465.00	1400	5	7000	0.08	7.64
	1,200	1,500.00	630.00	540.00	0.00	45.00	100.00	850.00	1,035.00	0.00	50.00	15.00	500.00	5,330.00	1400	2.5	3500	-0.52	-52.29
	350	1,875.00	600.00	180.00	0.00	15.00	40.00	1,000.00	625.00	0.00	130.00	15.00	500.00	3,489.00	1400	3	4200	0.17	16.93
	100	600.00	800.00	180.00	0.00	15.00	35.00	1,180.00	200.00	0.00	120.00	9.00	250.00	9,969.00	1450	13	18850	0.47	47.11
	1,440	1,080.00	2,400.00	270.00	0.00	40.00	90.00	1,200.00	2,400.00	0.00	234.00	65.00	750.00	22,217.00	1400	25	35000	0.37	36.52
	2,000	1,800.00	2,900.00	1,512.00	680.00	250.00	850.00	4,000.00	6,200.00	0.00	275.00	250.00	1,500.00	12,960.00	1350	11	14850	0.13	12.73
	950	1,400.00	750.00	720.00	500.00	40.00	155.00	4,200.00	2,550.00	0.00	560.00	135.00	1,000.00	7,594.00	1450	10.6	15370	0.51	50.59
	480	1,200.00	890.00	900.00	0.00	85.00	143.00	1,500.00	1,245.00	0.00	106.00	45.00	1,000.00	5,302.00	1400	8	11200	0.53	52.66
	450	900.00	750.00	360.00	0.00	68.00	112.00	1,100.00	950.00	0.00	80.00	32.00	500.00	10,592.00	1450	9.3	13485	0.21	21.45
	500	1,050.00	1,750.00	570.00	480.00	55.80	279.00	2,600.00	2,000.00	0.00	270.00	37.20	1,000.00	6,493.00	1400	7	9800	0.34	33.74
	180	750.00	700.00	268.00	0.00	35.00	85.00	2,600.00	1,200.00	0.00	140.00	35.00	500.00	10,255.00	1400	8	11200	0.08	8.44
	500	1,900.00	2,100.00	360.00	0.00	15.00	45.00	2,700.00	2,000.00	0.00	100.00	35.00	500.00	13,850.00	1400	10	14000	0.01	1.07
	1,300	2,400.00	1,400.00	900.00	0.00	75.00	130.00	4,100.00	2,200.00	0.00	230.00	115.00	1,000.00	15,583.00	1350	22	29700	0.48	47.53
	1,000	2,200.00	1,363.00	540.00	570.00	155.00	450.00	4,000.00	3,400.00	0.00	420.00	235.00	1,250.00	8,105.00	1400	10	14000	0.42	42.11
	600	2,100.00	1,000.00	720.00	0.00	45.00	135.00	1,400.00	1,300.00	0.00	180.00	125.00	500.00	11,934.00	1400	17	23800	0.50	49.86
	1,000	1,000.00	2,100.00	684.00	0.00	50.00	150.00	3,700.00	1,800.00	0.00	300.00	150.00	1,000.00	10,184.00	1400	16.7	23380	0.56	56.44
	600	2,100.00	1,660.00	540.00	700.00	64.00	540.00	1,500.00	1,200.00	0.00	250.00	30.00	1,000.00	8,517.00	1400	9	12600	0.32	32.40
	420	1,200.00	1,360.00	360.00	0.00	36.00	75.00	2,800.00	1,400.00	0.00	81.00	35.00	750.00	10,865.00	1450	8	11600	0.06	6.34
	600	1,200.00	580.00	520.00	425.00	80.00	320.00	3,200.00	2,500.00	0.00	450.00	240.00	750.00	14,890.00	1450	33	47850	0.69	68.88
	400	1,600.00	1,800.00	900.00	0.00	70.00	260.00	3,700.00	3,150.00	0.00	680.00	330.00	2,000.00	5,725.00	1400	7.75	10850	0.47	47.24
	150	1,200.00	1,350.00	360.00	0.00	30.00	70.00	950.00	700.00	0.00	105.00	60.00	750.00	9,890.00	1400	11.75	16450	0.40	39.88
	900	2,100.00	890.00	370.00	0.00	120.00	395.00	2,450.00	1,390.00	0.00	200.00	75.00	1,000.00	6,850.00	1400	18	25200	0.73	72.82
	300	1,200.00	210.00	680.00	250.00	90.00	360.00	1,800.00	600.00	0.00	180.00	180.00	1,000.00	8,476.00	1400	8	11200	0.24	24.32
	140	1,200.00	1,200.00	360.00	0.00	80.00	162.00	2,370.00	1,400.00	0.00	40.00	24.00	1,500.00	8,170.00	1350	8	10800	0.24	24.35
	750	1,200.00	800.00	360.00	0.00	45.00	95.00	2,150.00	1,500.00	0.00	210.00	60.00	1,000.00	14,170.00	1450	12	17400	0.19	18.56
	350	2,800.00	2,100.00	360.00	610.00	50.00	150.00	4,300.00	2,000.00	0.00	250.00	200.00	1,000.00	9,895.00	1350	9.6	12960	0.24	23.65
	300	1,500.00	1,035.00	360.00	640.00	150.00	420.00	2,000.00	2,500.00	0.00	150.00	90.00	750.00	14,686.00	1400	12	16800	0.13	12.58
	270	2,500.00	1,900.00	560.00	900.00	90.00	300.00	4,100.00	1,700.00	0.00	240.00	126.00	2,000.00	9,610.00	1450	12	17400	0.45	44.77
	150	1,200.00	1,700.00	540.00	310.00	60.00	180.00	2,400.00	2,250.00	0.00	260.00	60.00	500.00	12,332.60	1450	24.52	35554	0.65	65.31
	360	1,650.00	1,854.00	720.00	0.00	86.00	110.00	480.00	5,000.00	0.00	450.00	122.60	1,500.00	9,732.00	1350	7	9450	-0.03	-2.98
	300	1,500.00	1,407.00	360.00	0.00	40.00	100.00	2,715.00	1,400.00	700.00	140.00	70.00	1,000.00	15,616.00	1450	21	30450	0.49	48.72
	600	900.00	1,282.00	684.00	1,600.00	90.00	540.00	4,300.00	4,000.00	0.00	420.00	200.00	1,000.00	12,139.80	1450	16.06	23287	0.48	47.87
	400	1,260.00	1,300.00	504.00	1,150.00	80.00	401.80	2,730.00	3,000.00	0.00	352.00	212.00	750.00	8,505.00	1450	14	20300	0.58	58.10
	200	1,050.00	1,570.00	360.00	0.00	50.00	160.00	2,300.00	1,500.00	145.00	280.00	140.00	750.00	11,184.00	1450	20	29000	0.61	61.43
	2,500	1,000.00	1,346.00	288.00	0.00	60.00	140.00	2,000.00	2,250.00	0.00	400.00	200.00	1,000.00	11,963.00	1400	10.5	14700	0.19	18.62
	500	1,600.00	1,100.00	468.00	330.00	400.00	150.00	5,000.00	1,500.00	0.00	200.00	215.00	500.00	11,974.00	1350	11	14850	0.19	19.37
	450	1,200.00	1,650.00	365.00	0.00	90.00	163.00	4,300.00	2,600.00	0.00	234.00	172.00	750.00						
Cost	22,830	#######	#######	#######	9,145.00	######	7,962.80	#######	#######	845.00	8,911.00	4,203.80	#######						
											Total cost/hectar			381,534.40		Total Benefit	646436		
											Average Cost/hectar			10,311.74		Average Benefit	17471.2432		
											Gross Market Margin/hectar			0.41					
											Gross Market Margin(100%)/hectar			41.00					